

[54] SAFETY CLOSURE

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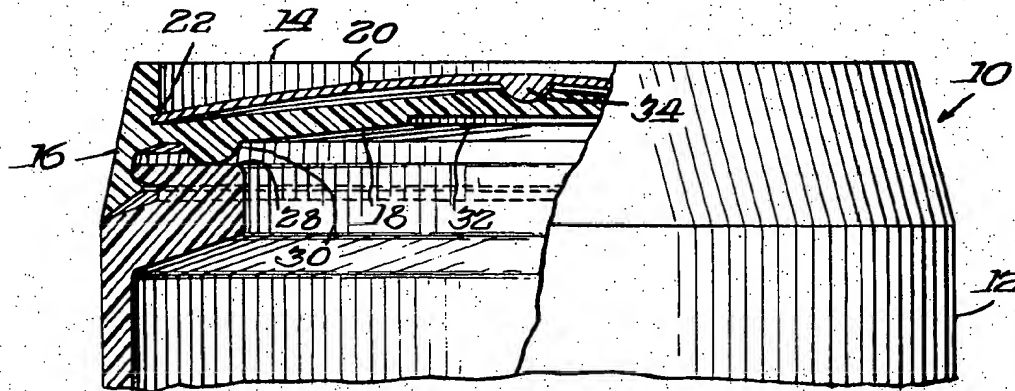
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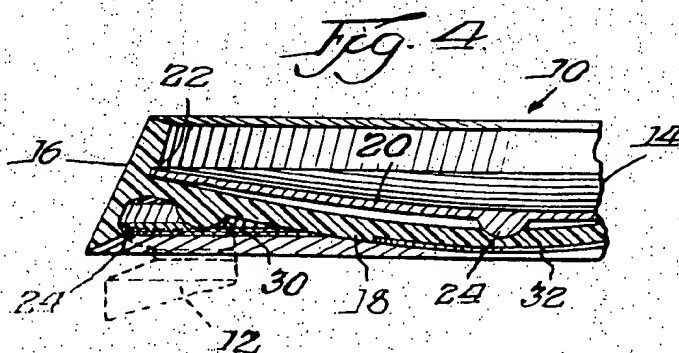
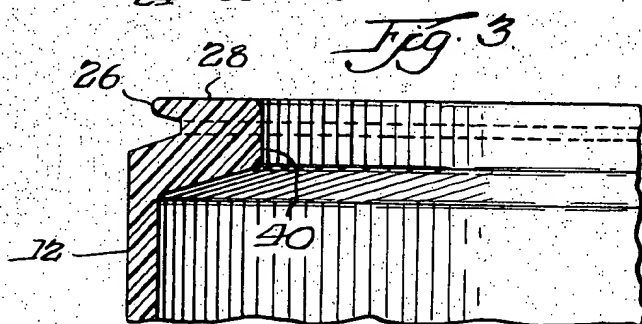
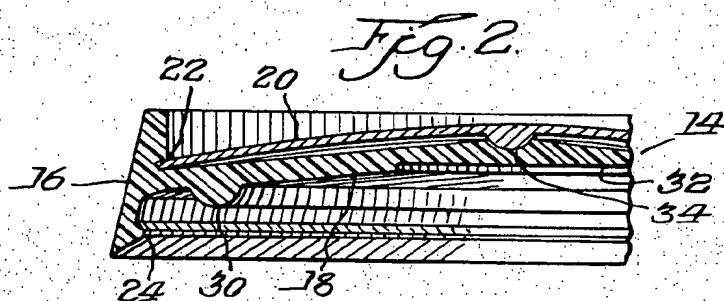
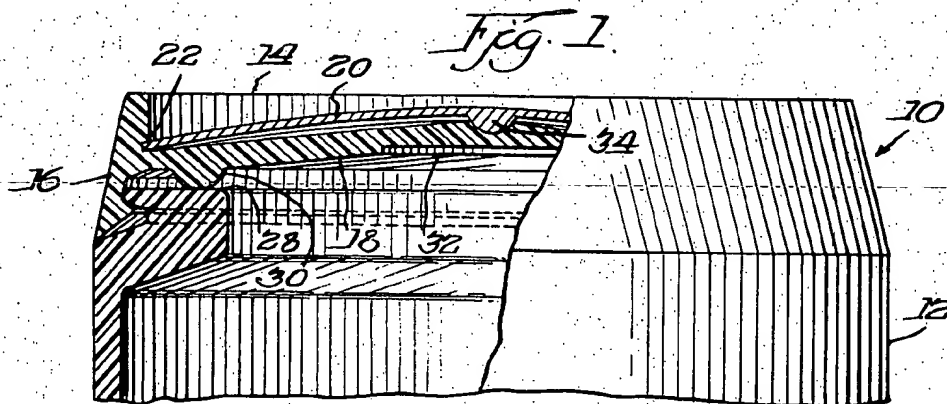
[57] ABSTRACT

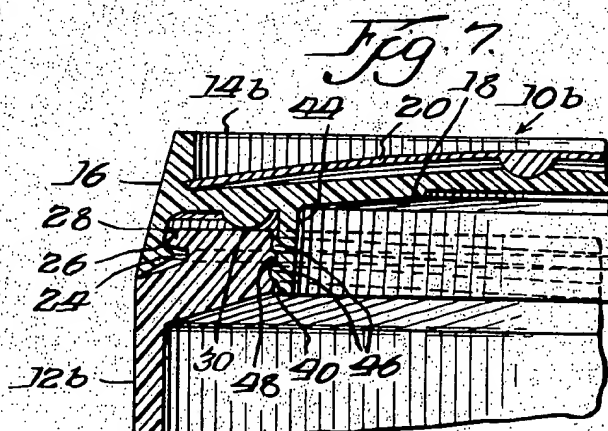
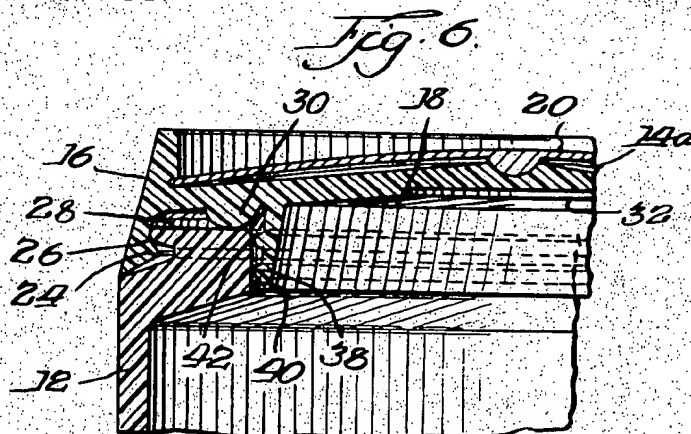
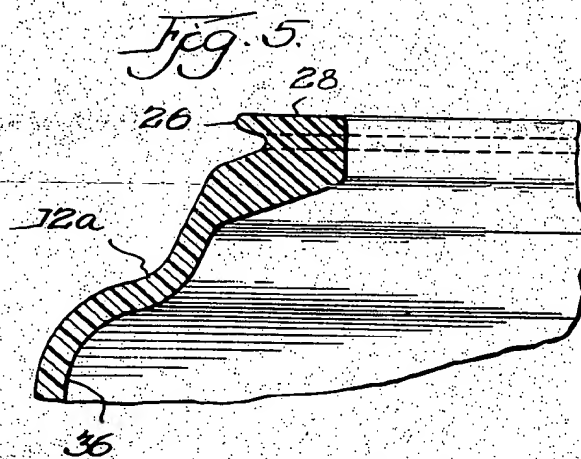
A safety closure for a container having an annular lip and a shoulder adjacent the lip. The closure includes a unitary cap, having a rim and a dome, and a snap-action disc which is coupled to the cap. The rim of the unitary cap includes a locking projection which engages the lip on the container. The closure is placed in an unlocked position by applying a downward force to the snap-action disc to change the disc from a convex position to a concave position.

10 Claims, 7 Drawing Figures



SHEET 1 OF 2





# 1 SAFETY CLOSURE

The invention relates to a safety closure for a container to prevent opening of the closure by one class of persons while permitting another class of persons to open easily the closure.

The safety closure is useful in preventing young children from removing the closure from the container and obtaining access to the contents which could be harmful or poisonous to the child. However, the safety closure can be easily opened by an adult or an older child who is aware of the harmful nature of the contents. Thus, a purpose of the invention is to provide a safety closure for a container which is extremely difficult for a child to unlock while being easy for an adult to unlock.

More particularly, the invention relates to a safety closure for an open-ended container having an annular lip at the open end of the container and a shoulder adjacent the lip. The closure includes a unitary cap having an annular rim and a dome. The rim has a locking projection extending inwardly therefrom for engaging the lip of the container in a locked position of the closure. The dome has a fulcrum means for engaging the shoulder of the container and pivoting the locking projection outwardly from the lip to an unlocked position of the closure. A snap-action disc is coupled to the cap and is convex when the closure is in the locked position. This disc is concave when the closure is in the unlocked position and depresses the dome of the cap when it is in the concave position.

In order to operate the safety closure a downward force is applied to the snap-action disc and the dome of the cap is depressed. This causes the locking projection to pivot away from engagement with the lip on the container thereby causing the safety closure to assume an unlocked position. The mode of operating the safety closure can be indicated by a legend on the closure.

An advantage to the invention is that for a person able to read little effort is required to learn how to operate the safety closure. At the same time, a person unable to read, such as a young child cannot learn to open the safety closure.

Another advantage to the invention is that the strength of the downward force which is necessary to move the disc to the unlocked position can be varied to effectively vary the age at which a child can successfully unlock the safety closure. This results from the consequence that in general younger children, as a class, have less strength than older children, as a class.

The design of the safety closure does not permit a person to grasp the closure and forcibly remove it from the container when the safety closure is in a locked position. This feature protects against the container being forced open by a person otherwise unable to operate the safety closure. The safety closure is also protected from accidental opening by pressing of the top of the closure against a surface such as a table top or a wall. One form of the invention is demonstrated in the drawings in which:

FIG. 1 is a partially cut-away view of a safety closure and container embodying the present invention;

FIG. 2 is a sectional view of the safety closure shown in FIG. 1;

FIG. 3 is a sectional view of the container shown in FIG. 1;

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FIG. 4 is a sectional view of the safety closure of FIG. 1, in an unlocked position;

FIG. 5 is a sectional view of a modified container for practicing the present invention;

FIG. 6 is a sectional view of another form of safety closure having a moisture barrier and a container embodying the present invention; and

FIG. 7 is a sectional view of another form of safety closure and container embodying the present invention.

Referring to FIG. 1, a safety closure indicated generally by the numeral 10 is shown assembled onto a container 12. The safety closure 10 includes a unitary cap 14 having a rim 16 and a dome 18. The safety closure 10 also includes a snap-action disc 20 which engages a retaining groove 22 on the interior surface of the rim 16.

The rim 16 of the cap 14 has an annular locking projection 24 which extends inwardly from the rim 16. The locking projection 24 engages an annular lip 26 located at the open end of the container 12. The container 12 has a shoulder 28 positioned adjacent the lip 26. The unitary cap 14 includes an annular bead 30 which is located on the dome 18 of the cap. The annular bead 30 engages the shoulder 28 of the container 12 and serves as a fulcrum means to pivot the locking projection 24 away from engagement with the lip 26 in a manner to be described.

The safety closure 10 is shown in FIG. 1 in a locked position on the container 12. In the locked position, the snap-action disc 20 is in a convex configuration and the locking projection 24 engages the lip 26 to prevent the closure 10 from being removed from the container 12. In order to place the safety closure 10 in an unlocked position, a downward force is applied to the snap-action disc 20 thereby moving the disc downward and depressing the dome 18 of the unitary cap 14. As the dome 18 is depressed downward, the rim 16 pivots about the annular bead 30 and releases the locking projection 24 from engagement with the lip 26. The snap-action property of the disc 20 causes the disc to remain in the concave position shown in FIG. 4 thereby holding the safety closure 10 in an unlocked position. The closure 10 can then be removed by lifting it from the container 12. This operation can be performed by a person using only one hand.

To return the safety closure 10 to a locked position on the container 12, the safety closure 10 is placed on the container 12 and a downward force is applied to the rim 16 of the unitary cap 14. The downward force on the rim 16 pivots the locking projection 24 into engagement with the lip 26 and returns the snap-action disc 20 to the convex configuration of the locked position shown in FIG. 2.

The mode of operating the safety closure 10 can be indicated by a legend such as "press here" located on the snap-action disc 20 of the safety closure. This legend would inform a person able to read, such as an adult, how to operate the safety closure while concealing the method of operation from a young child who is unable to read. Also, the mode of operation permits an adult to learn with little effort how to operate the safety closure.

The annular bead 30 on the dome 18 is illustrated as being continuous. However, the bead may be interrupted if desired as long as the contact area of the bead 30 with the shoulder 28 is sufficient to provide a ful-

crum means against the shoulder 28 to remove the locking projection 24 from engagement with the lip 26. In a similar fashion, the locking projection 24 may be continuous as illustrated or may be interrupted.

The cap 14 is made of a flexible material to permit the dome 18 of the cap to be depressed when acted upon by the snap-action disc 20. Preferably, the unitary cap 14 is formed of a flexible plastic material. However, other flexible materials may be utilized to form the cap 14. The cap 14 may include a recessed portion 32 to facilitate flexing of the dome 18 during movement of the dome from the locked position to the unlocked position.

The snap-action disc 20 assumes either a convex configuration as shown in FIG. 1 or a concave configuration as shown in FIG. 4. The disc 20 will not assume a planar position and will remain only in the convex or concave configuration shown in FIGS. 1 and 4, respectively. Typically, the snap-action disc 20 is formed of a metal, although other materials which permit the snap-action effect can be utilized to form the disc.

The downward force required to move the snap-action disc 20 from the concave configuration of FIG. 1 to the convex configuration of FIG. 4 can be varied by varying the strength of the disc 20. Thus, the force required to unlock the safety closure 10 can be increased to increase the degree of difficulty encountered in opening the safety closure. In this way, the age of the group of children which can successfully open the safety closure can be varied.

A bead 34 may be located on the snap-action disc 20 on the side of the disc adjacent the dome 18 of the cap 14. The bead 34 serves to concentrate the force of the snap-action disc 20 on the dome 18. However, the snap-action disc 20 may be utilized without the bead 34.

The rim 16 of the cap 14 extends above the level of the snap-action disc 20. This prevents accidental opening of the safety closure 10 since the top of the rim 16 prevents a surface from applying force to the snap-action disc 20. Therefore, inverting the safety closure 10 and container 12 and pressing the closure 10 against a surface such as a table will not result in opening of the safety closure 10. The smooth contour between the container 12 and the safety closure 10 as well as the inward tapering of the rim 16 prevents the safety closure 10 from being readily grasped and removed from the container 12 when the closure is in a locked position. Additionally, the low profile of the safety closure 10 provides a small area for grasping the safety closure and removing the closure when it is in a locked position.

The container 12 illustrated in FIG. 1 is generally cylindrical in shape. However, other shapes of containers can be utilized in the practice of the invention. Referring to FIG. 5, a modified container 12a having a lip 26 and a shoulder 28 is illustrated. The annular lip 26 and the shoulder 28 are identical to the lip 26 and shoulder 28 of the container 12 shown in FIG. 3. The body 36 of the modified container 12a is larger than the mouth of the modified container and the body 36 need not be cylindrical. The container 12a is suitable for use with the safety closure 10 in practicing the invention as are other container configurations which include the lip 26 and the shoulder 28. The lip 26 and the shoulder 28 are required to cooperate with the safety closure 10 in the manner previously described.

Referring to FIG. 6, a modified safety closure indicated generally by the numeral 10a and having an annular moisture barrier 38 is illustrated. In FIG. 6 the same reference numerals indicate the same parts as in the other Figures. The moisture barrier 38 extends downwardly from the dome 18 of the unitary cap 14a to engage an interior wall 40 of the container 12 and includes ribs 42. The ribs 42 contact the interior wall 40 to prevent moisture from entering the container 12 when the safety closure 10a is in a locked position. The operation of the safety closure 10a is the same as for the safety closure 10. Although a pair of ribs 42 are illustrated on the moisture barrier 38, other numbers of ribs 42 could be utilized.

Referring to FIG. 7, another modified safety closure, indicated generally by the numeral 10b, and a modified container 12b are illustrated. In FIG. 7, the same reference numerals indicate the same parts as in the other Figures. The safety closure 10b includes an annular extension 44 which extends downwardly from the dome 18 of the unitary cap 14b and has an externally threaded portion 46. The externally threaded portion 46 mates with an internally threaded portion 48 on the interior wall 40 of the modified container 12b.

The operation of the modified safety closure 10b is similar to the operation of the safety closure 10. Initially, a downward force is applied to the snap-action disc 20 thereby moving the disc downward and depressing the dome 18 of the unitary cap 14b. As the dome 18 is depressed downward, the rim 16 pivots about the annular bead 30 and releases the locking projection 24 in a manner similar to that shown for the safety closure 10 in FIG. 4. The snap-action property of the disc 20 causes the disc to remain in a concave position and hold the safety closure 10b in an unlocked position. The safety closure 10b is then removed from the container 12b by rotating the closure 10b to release the threaded engagement between the safety closure 10b and the container 12b.

The safety closure 10b is returned to a locked position on the container 12b by rotating the safety closure 10b into threaded engagement with the container 12b. A downward force is then applied to the rim 16 of the unitary cap 14b and the safety closure 10b moves to a locked position in a manner similar to that previously described for the safety closure 10.

It is to be understood that various modifications can be made to the disclosed safety closure and container without departing from the scope of the invention, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and the scope of the invention.

What is claimed is:

1. A safety closure for an open-ended container having an annular lip at the open end thereof and a shoulder adjacent said lip said closure comprising:
  - a unitary cap having an annular rim and a dome;
  - said rim having a locking projection extending inwardly from the rim for engaging the lip of the container in a locked position of the closure;
  - said dome having fulcrum means for engaging the shoulder of said container and pivoting said locking projection outwardly from said lip to an unlocked position of the closure; and
  - a snap-action disc coupled to said cap, said disc being convex when the closure is in the locked position and being concave when the closure is in the un-

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locked position, said snap-action disc depressing the dome of said cap when said disc is in a concave position.

2. The safety closure of claim 1 wherein said rim extends above the snap-action disc when said disc is in the convex position to prevent accidental unlocking of the safety closure.

3. The safety closure of claim 2 wherein said rim mates with said container and tapers inwardly toward the top thereof to prevent grasping and removal of the closure when in the locked position.

4. The safety closure of claim 1 wherein said rim has a retaining groove on an interior surface thereof for receiving said snap-action disc.

5. The safety closure of claim 1 wherein the dome of said cap has a recessed portion to facilitate flexing of said dome in response to depression by said snap-action disc.

6. The safety closure of claim 1 wherein the snap-action disc has a centrally located bead on a side of said disc facing the dome for concentrating the lever action of said disc on the dome.

7. The safety closure of claim 1 wherein the dome of said cap includes moisture barrier means extending downwardly from the dome for mating with an interior surface of said container.

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8. The safety closure of claim 7 wherein said moisture barrier means includes an annular rib for engaging said interior surface.

9. The safety closure of claim 1 wherein the dome of said cap includes a downward extension having an externally threaded portion thereon for mating in engagement with an internally threaded portion of said container.

10. A safety closure for an open-ended container having an annular lip at the open end thereof and a shoulder adjacent said lip said closure comprising:

a cap having a rim and a dome;

said rim having a locking projection extending inwardly from the rim for engaging the lip of the container in a locked position of the closure;

said dome having fulcrum means for engaging the shoulder of said container and pivoting said locking projection outwardly from said lip to an unlocked position of the closure; and

snap-action means for holding said cap in a convex configuration when said closure is in the locked position and in a concave configuration when said closure is in the unlocked position, said snap-action means being coupled to said cap and being positioned to act on the dome of said cap.

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